

TR 810
.E3
Copy 2

MANUAL OF INSTRUCTIONS
FOR

TYPE "L"
AVIATION
CAMERA

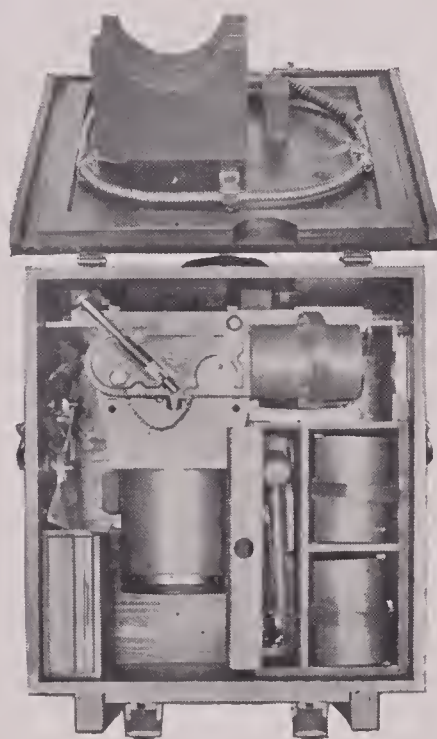
American Model

W 21-82

Eastman Kodak Co., Rochester, N.Y.

INSTRUCTIONS FOR TYPE "L" AVIATION CAMERA

American Model



Copy 2.

1111

INSTRUCTIONS FOR TYPE "L" AVIATION CAMERA

SEMI-AUTOMATIC PLATE CHANGER

1. The general principles of this camera are somewhat similar to those incorporated in the Types "C" and "E" Aviation Cameras.

2. (a) A magazine containing the unexposed plates is placed directly above the exposure aperture, the plates falling into position as required.

3. (b) The exposed plate is moved along horizontally until opposite the receiving magazine, which is attached in an inverted position to an extension of the camera.

4. (c) Exposure by focal plane shutter with separate capping device.

5. In the "L" Type Camera, changing the plate and setting the focal plane shutter is one operation, and this may be accomplished either by hand or automatically by the action of wind on a propeller, at the will of the operator.

6. **Changing by hand Operation.** Fig. 1 shows a general view of the apparatus arranged for hand operation.

7. The magazine 580A is loaded in the dark room and placed in position on runners provided on top of the camera. A second empty magazine 580B is placed beneath an extension of the camera in the position shown.

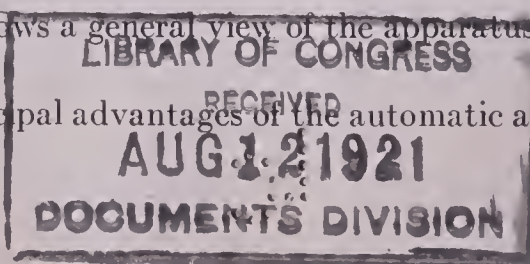
8. A hand lever 599 on the side of the camera operates the plate changer and at the same time sets the focal plane shutter. This lever must be moved backwards and forwards once to set the shutter before opening the magazines. The magazine is opened by releasing the catch on the metal slide and drawing the slide towards the square end of the magazine until the catch engages.

9. To expose a plate, depress the knob 627 smartly to its extreme position and release. Then immediately "change the plate" by operating the hand lever. Before removing either magazine, pass all unexposed plates to the lower magazine. See that receiving magazine is fully open before placing on the camera. Also in unloading the camera, see that magazines are closed before removing same. This is most important to avoid fogging the plates.

AUTOMATIC CHANGING

10. Fig. 2 shows a general view of the apparatus arranged for automatic operation.

11. The principal advantages of the automatic attachment are:



War 21-82

G.W.B. 3/20/23

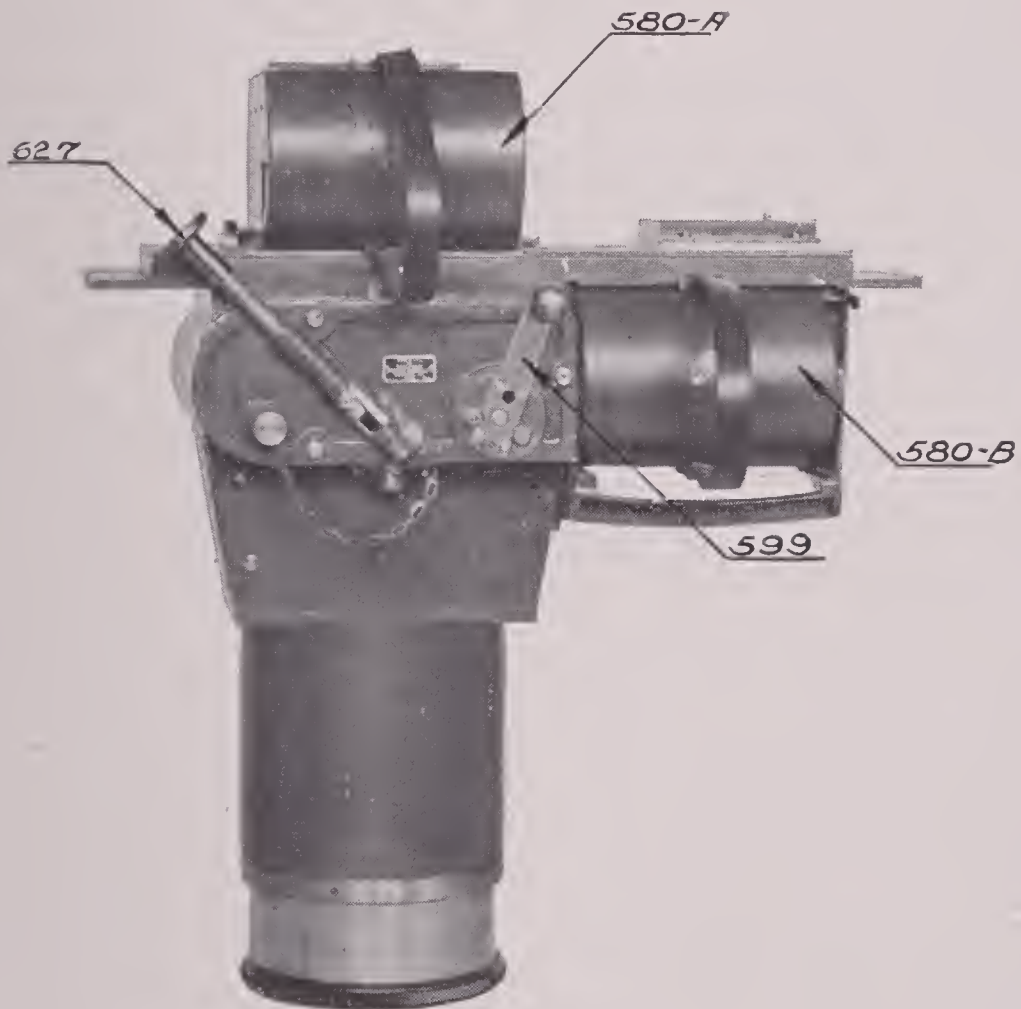


Figure 1

- (a) A series of photographs may be taken by the simple operation of a lever for each exposure.
- (b) The camera may be operated from a distance by a cable release.
- (c) The operator is relieved of the responsibility of manipulating the camera mechanism.

12. Should it be necessary to use the cable release, it is essential that it be attached to the camera before setting the shutter or opening the loaded magazine, as the action of attaching the cable is liable to release the shutter.

13. Lay the cable out straight and push the brass end into the bottom end of the plunger tube, slip the looped end of the cable over the stud provided on the plunger, securing same in position with the brass knurled nut.

14. The magazines having been placed in position and the shutter set in the manner previously described in paragraph 8, unscrew the shutter setting lever pin, No. 653, from its position F in the shutter setting operating plate, and screw into the hole G provided in shutter setting lever. The motive power for making the change is provided by a propeller No. 868 pivoted on a ball journal bearing No. 834, and driven by the draft from the engine propeller or the current of air occasioned by the speed of the machine. A flexible double coil spring shaft running in the casing No. 838 transmits the power to the changer mechanism. The flexible drive is attached to the camera by means of a milled nut locked in position by a spring to prevent the nut becoming accidentally detached. After the flexible drive has been attached to the camera, turn the propeller by hand a sufficient number of times to perform the complete cycle of changes, in order to be sure that the shaft is properly connected.

15. Moving the lever No. 572 releases the shutter and exposes the plate. When the lever is released, and not before, the changer gear is automatically engaged with the drive from the propeller, and the plate changed and shutter set for the next exposure. Further, by the action of the interlocking cam and lever, fully described in paragraphs 55, 56 and 57, the plunger is locked in such a manner that it can be depressed once only for each plate set in position. This device has been rendered necessary owing to the fact that it would be possible otherwise to open the shutter while changing the plate. With an air velocity of, say, 50 miles per hour on the propeller, a plate is changed in approximately 10 seconds, the maximum rate of change likely to be required with a minimum air pressure. Provided the propeller is not altered in any way, the speed of plate change is increased in direct proportion to the air velocity.

16 **Changing from power to hand operation.** The shutter setting lever pin No. 653 should always be left in either the position for hand or power operation. Should, however, the plunger be depressed when the screw is hanging idle, proceed as follows to connect for hand operation.

17. In order to insert the shutter setting lever pin No. 653 in the socket "F" (Fig. 2) for hand operation, it is necessary to operate the

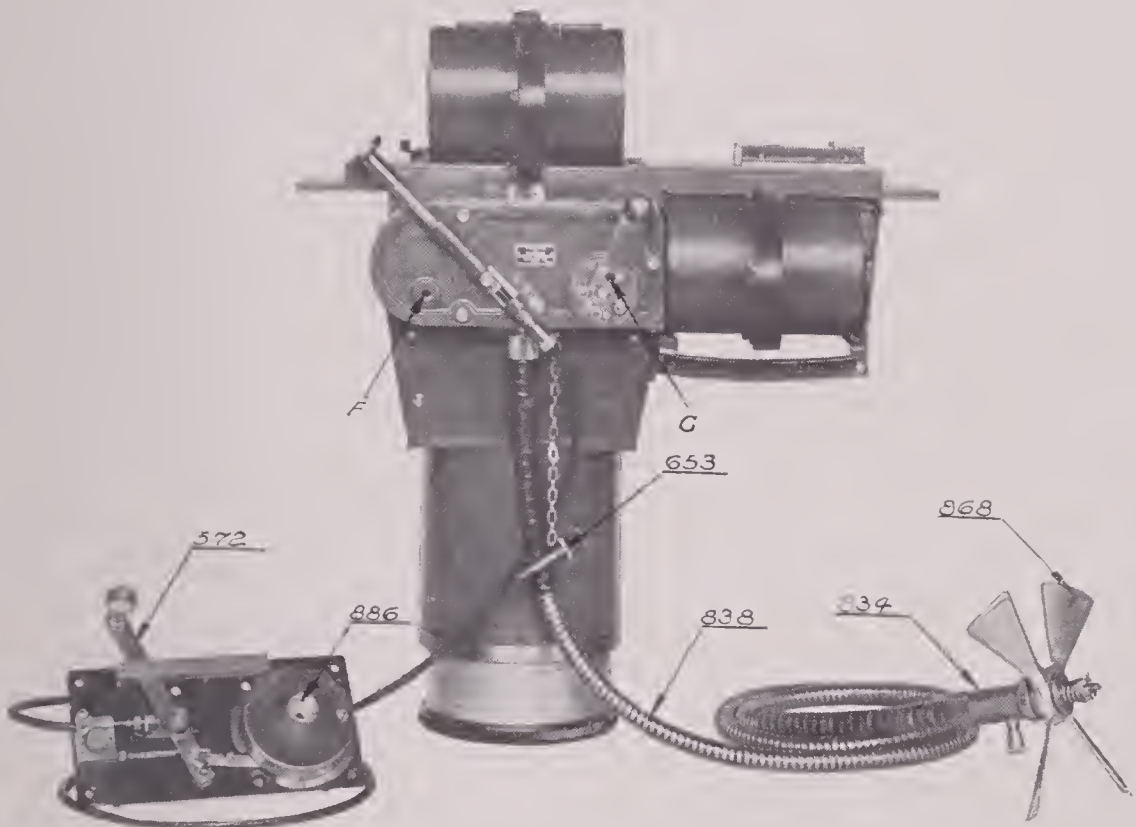


Figure 2

mechanism until the opening in gear wheel No. 597 is in alignment with the opening "F" in the gear case cover. This can be accomplished by inserting a small metal rod or wire nail in the socket for the flexible shaft connection and turning the spindle until the two openings are in alignment. The same result can be obtained by attaching the flexible shaft and turning the propeller by hand until the pin can be properly inserted.

ATTACHING THE CAMERA TO PLANE

18. The camera is designed to enable it to be carried on either:—
 - (a) The out-board fitting, for which purpose two tubes are carried right through the body of the camera, so that it can be bolted to the fitting, or
 - (b) It may be supported on a "floor support" resting on the projecting lips at each end of the camera body.
 - (c) A cradle is supplied for fitting the camera in certain types of planes either in front of or behind the observer.
 Special instructions for the installation of cameras on these three kinds of supports are furnished in a separate leaflet.

MAGAZINES

19. These are constructed entirely of metal to hold twenty-four (24) plates only. A strap is provided to enable the operator to more easily attach and remove the magazine from the camera. This strap can also be utilized as a carrying handle. Before loading, the septums should be counted and carefully inspected. If any of the septums are bent or dented, they should be repaired before using. A septum forming outfit and mallet are provided for this purpose. When loading the septums, it is of the utmost importance that the plates are of the correct size. If the plate is too wide, it will ride on the turned up lip at the edge of the septum, causing the camera to jam. The septums should be placed in the magazine with the open edge towards the metal instruction plate attached to the side of the magazine and the plates must be placed in the septums and the loaded septums in the magazine with the emulsion side up, as indicated in Fig. 3.

20. Fig. 3 shows the correct method of placing the septums in the magazine.

21. In view of the fact that the whole action of the camera is dependent on the plates falling into position with certainty, the above paragraph on dark room manipulation of plates, septums and magazines should be carefully observed.

SHUTTER

22. An adjustable aperture focal plane shutter is employed. This shutter is equipped with a sliding saddle and cords to adjust the width of the opening. Shutter is arranged as close as possible to the plate, being actually $\frac{3}{16}$ " from the emulsion, thereby obtaining the highest possible light efficiency.

23. Fig. 4 shows a view of the spring tension. The left hand gear shaft crank No. 663 is connected to the shutter spring by multiplying gearing, enabling twenty turns to be given to the spring by one revolu-

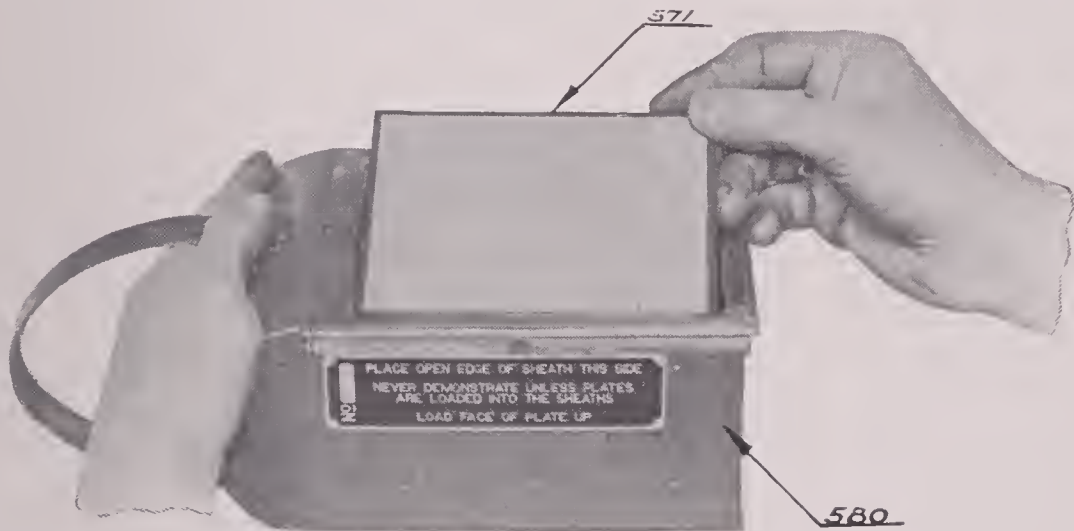


Figure 3

tion of the crank 663. In the position shown, shutter spring is set at the minimum tension, thus enabling the opening in shutter to be adjusted to any desired width.

24. To increase the tension, pull the knob and turn lever in clockwise direction.

25. The following actual shutter speeds have been obtained by taking the average of tests on several cameras.

26. SHUTTER SPEED TABLE

Tension	Curtain Apertures			
	1	2	3	4
No. 1	35	45	53	85
No. 2	45	50	70	110
No. 3	50	60	85	125
No. 4	60	65	90	145

LENSES

27. A sectional view showing the arrangement of lenses and adjustment tubes is shown in Fig. 5.

28. On account of the variety of lenses of different makes and sizes used in this camera, it is necessary to provide several sizes of lens tubes, diaphragms and adapters to accommodate them. A table showing the parts used with the various lenses arranged in series is given in Fig. 5.

29. These groups are comprised of the following lenses:

30. Lens Series No. 0:

5x7 Cooke Anast. Series II.

Lens Series No. 1:

5x7 Cooke

8- $\frac{1}{4}$ " Focus Goerz Dogmar.

5x8 Goerz Dogmar.

5x8 Carl Zeiss Jena Tessar.

No. 16-5x8 B&L Zeiss Tessar I-C F-4.5.

Lens Series No. 2:

8- $\frac{1}{4}$ " Focus Heliar lens.

6- $\frac{1}{2}$ x8- $\frac{1}{2}$ Carl Zeiss Jena Tessar.

No. 17-6- $\frac{1}{2}$ x8- $\frac{1}{2}$ B&L Zeiss Tessar I-C F-4.5.

Lens Series No. 3:

6- $\frac{1}{2}$ x8- $\frac{1}{2}$ Carl Zeiss Jena Tessar.

10 $\frac{1}{2}$ " Focus Zeiss Tessar Ross.

210 M. M. Carl Zeiss Jena Tessar.

8- $\frac{1}{2}$ " -21 C. M. Carl Zeiss Jena Tessar.

10" Carl Zeiss Jena Tessar.

9 $\frac{1}{2}$ " Goerz Dogmar.

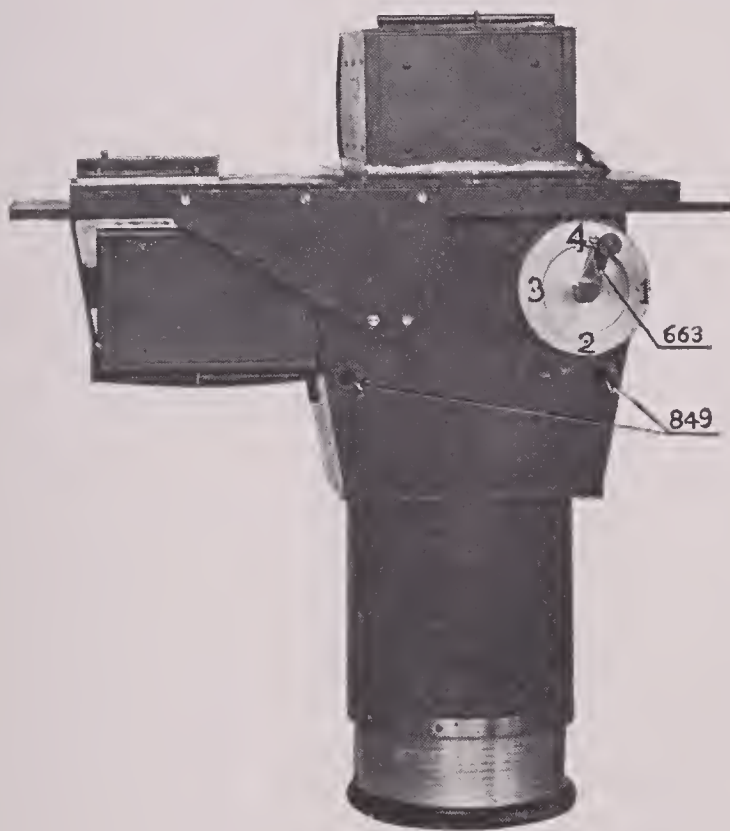


Figure 4

10 $\frac{3}{4}$ " Goerz Dogmar.
9 $\frac{1}{2}$ " Steinheil Triplar F-3.8.
6 $\frac{1}{2}$ x8 $\frac{1}{2}$ Cooke Anast. Series II.
10" Cooke Anast. Series II.
9 $\frac{1}{2}$ " Heliar lens
24 C. M. Heliar lens.

Lens Series No. 4:

No. 18 8x10" B&L Zeiss Tessar I-C F-4.5.
11 $\frac{3}{4}$ " Focus Heliar lens.
12" Heliar lens.
30 C. M. Heliar lens.

31. After the lens has been accurately focused, Unit 96 is used to lock the lens adjusting sleeve to the camera. U-258 serves as a protector for the end of this sleeve.

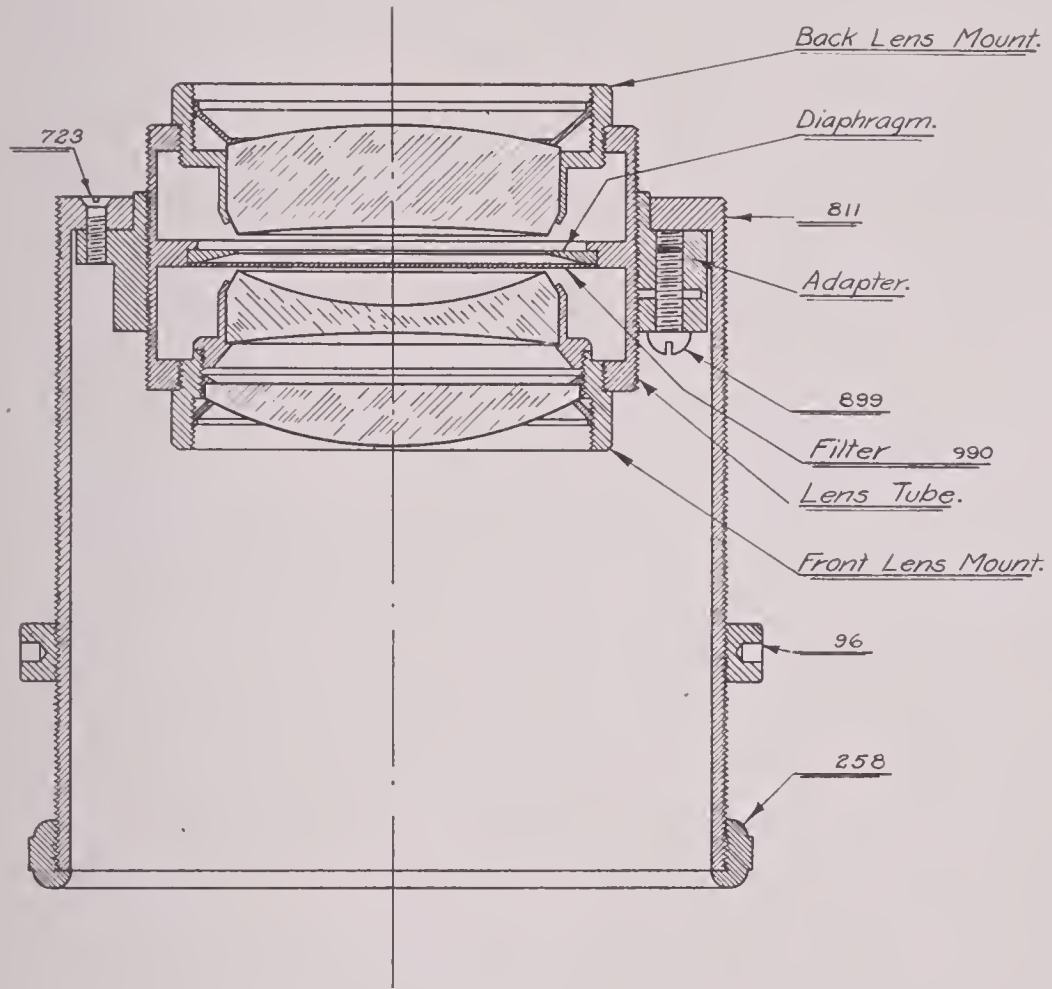
32. **Focusing.** The camera is focused upon assembly at the factory; should it become necessary, for any reason, to re-focus it, the following procedure is to be observed.

33. For this purpose a special septum, ground glass focusing screen and focusing magnifier are provided in each repair kit. The septum is similar to those regularly used, except that a rectangular opening 2x3" is cut in the middle of the back to permit of observation of the image falling on the focusing screen. On the central portion of the ground glass surface are two crossing pencil lines. Over these pencil lines is cemented a thin glass plate.

34. For focusing, it is necessary to entirely release the tension on the shutter; this may be accomplished by removing the small screw shown on Fig. 4 on the shutter tension dial. This will allow the lever to rotate counter clock-wise beyond the zero tension. Having done this, the shutter curtain will stay in any desired position. The slit should be made at least an inch wide and brought to a position corresponding to the middle of the plate.

35. The focusing screen is now placed in the special septum with the ground surface in the position ordinarily occupied by the photographic emulsion. The septum and screen are then put in the focal plane of the camera with the ground glass surface toward the lens. The image of a suitable object, a mile or more distant, is next caused to fall on the focusing screen (the light passing through the curtain opening) where it may be observed by the aid of the magnifier, which is so focused that the pencil lines appear very sharply defined.

36. The eye and magnifier are then moved back and forth side-wise, maintaining the contact of the magnifier with the glass, and careful note taken as to whether the image of the distant object moves with regard to the pencil mark. If it does move, the lens is not properly focused and must be screwed in or out by turning the lens adjusting sleeve 811, Fig. 5. If the image of the distant object moves in the same direc-



LENS SERIES - PART LIST.					
Series	0	1	2	3	4
Lens Tube.	897	256	254	850	883
Diaphragm.	257	257	255	831 884 898	831 884 898
Adapter.	809	809	809	810	892

Figure 5

tion as the eye, the lens is too far away from the plate; if it moves in the opposite direction to that of the eye, the lens is too close to the plate. When there is no observable relative motion between the line and the image of the distant object as the eye is moved back and forth, the lens is properly focused and the lens adjusting sleeve must be locked in position by screwing down unit 96. This method is called focusing by parallax.

37. It sometimes happens that due to the vibration of the plane, one of the lens cells may become loosened and partially unscrewed. This will seriously disturb the definition and give pictures lacking in sharpness. If at any time out of focus pictures are obtained, care should be taken before re-focusing, as outlined above, to see that all lens components are tight.

38. **Color Filters.** Depending upon light conditions, color filters may or may not be used. Filters of two sorts K1 and K2 are supplied with the camera. They are in the form of thin gelatine films about three inches square and for use they must be trimmed to a circular disc, which will fit in the lens mounting, as shown in Fig. 5. To use a filter, it is necessary to unscrew the front lens or lenses and insert the filter in the position shown. If there is a catch or a screw of any sort holding the front lens cell in place, it must be removed. After the filter is in place, care must be taken to see that the front lens cell is properly replaced, screwed home securely and locked, if a locking device is provided. After inserting the filter, the focus of the camera should be verified. The gelatine film filters are very delicate and should under no circumstances be touched by the fingers. Grease or moisture from the hand will render them useless. In cutting and handling, they should be held between sheets of paper.

CABLE RELEASES

39. Method of attaching this to the camera is described in the general instructions given in Paragraph 13.

40. In use the cable must be kept as straight as possible, but, if a bend is unavoidable, this must be allowed as large a radius as convenient.

41. An adjustment is provided, in the event of the cable stretching, by means of a nut with locknut at the point of attachment to the swivel on the hand lever. When making an adjustment, care must be taken to see that the plunger is allowed its full travel. This should be tested with the camera in position on the aeroplane.

42. An indicator is incorporated with the release which records the number of exposures made. Before attaching the cable to the camera or opening the loaded magazine, set the indicator at zero by turning the Counterset Button No. 886. (See Fig. 2).

43. It is usual to fix the release in the observer's cockpit, clamping the base plate to the vertical support on the left hand side. If desired, however, cord or wire can be attached to a groove in the top of the hand lever and led to a convenient position for the pilot to operate the camera himself.

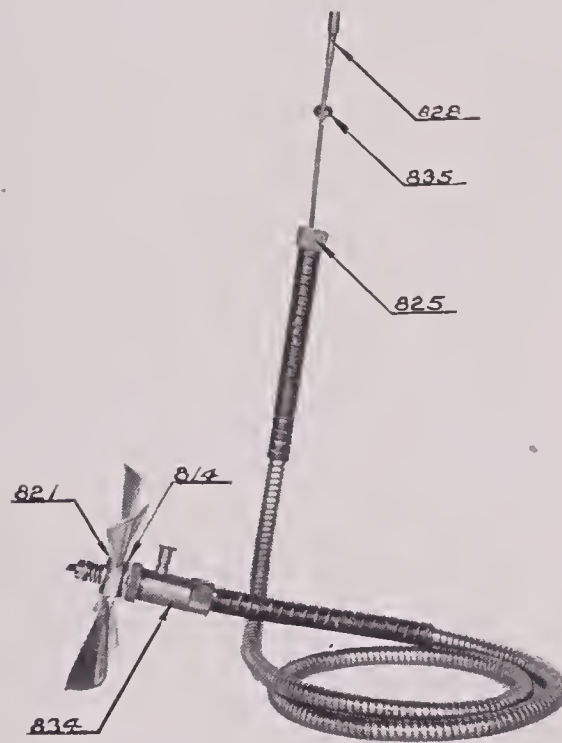


Figure 6

PROPELLER DRIVE

44. To attach this to the camera, first see that the driving dog No. 828 on the end of the inner shaft is in correct engagement with the camera mechanism and slip the loose collar 835 into the recess in the camera flange. Screw the nut 825 up as tight as possible, testing the propeller at the same time for signs of binding. This should revolve quite freely unless the exposure plunger has been depressed, in which case the driving gear will be in engagement, and the exposure and changer mechanism will make one complete cycle of operations before the propeller again runs free. This cycle of operations is fully described in paragraph 57.

45. Journal 834 carrying the propeller must be rigidly attached to the aeroplane in a position in which the propeller will receive a continuous current of air. This is essential in order that the propeller revolves at sufficient speed to change the plates in not more than ten seconds. Unless the journal is properly adjusted it may have a tendency to revolve under the influence of friction from the internal shaft and this will damage the outer casing. If possible, it is as well to stay the casing at one or two parts in its length to the aeroplane to prevent excessive vibration.

46. The position in which the camera is carried and the construction of the aeroplane will determine the method of attaching the propeller. In the event of it being found advisable to fit the propeller to the rear of the camera, a spare propeller is provided with the blades set at the reverse angle to the one usually employed. This permits of the shaft being placed in a trailing position with an "easier" bend than might otherwise be possible. The propellers are marked "R.H." (right hand) and "L.H." (left hand).

47. The method of attaching the propellers to the shaft by gripping same between two large fibre friction washers, 814 and 821, provides a cushion drive which prevents damage to the camera mechanism should a broken plate cause the machine to jam.

48. In fitting the propellers, care must be taken that these are placed the correct way on the spindle. The propellers are marked R.H. (right hand) for the forward drive and L. H. (left hand) for trailing drive. Care must be taken to select the correct propeller. In looking at the propeller end of the flexible shaft, this must rotate in a clockwise direction in order to give the correct movement to the camera.

CAMERA MECHANISM

49. The action of transferring the plates from the top magazine to the lower receiving magazine is accomplished by means of a flat sliding carrier 833 (shown in the part list).

50. The plates drop out of the top magazine into hole cut in this carrier which is arranged to rest in a position directly above the exposure aperture. This carrier is operated by gear wheels engaged with toothed racks attached to each side of the carrier, which moves the plate from the exposing position to the opening immediately over the receiving magazine. The gear wheels are revolved by a quadrant gear 995 shown in Fig. 7.

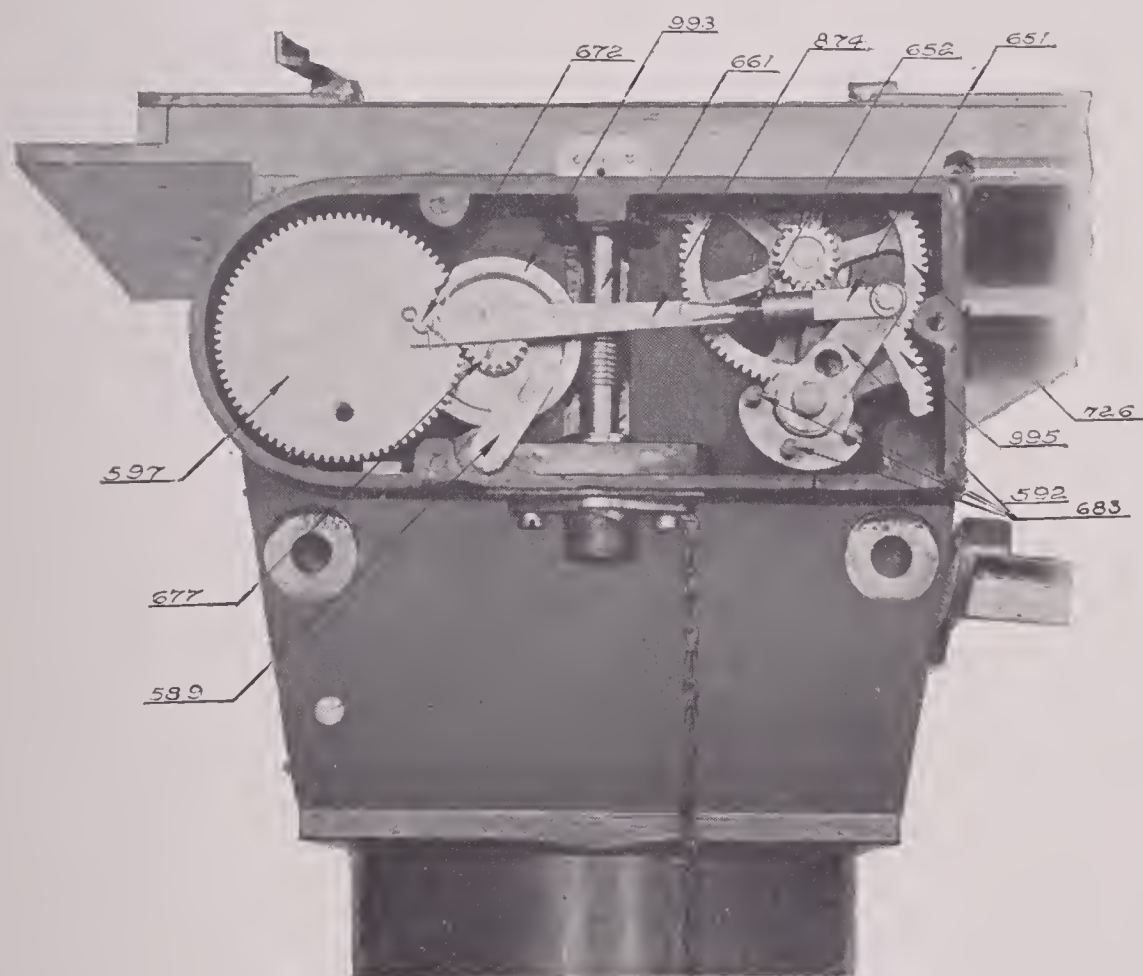


Figure 7

AUTOMATIC CHANGING BY MEANS OF THE PROPELLER

51. The flexible shaft is attached to the worm spindle 661, which is revolved at a high rate of speed by the force of the air on the propeller. Power is transmitted from the worm to the worm gear 993 which in turn revolves the intermittent gear on the left hand side No. 597, until the gap in the teeth is opposite the driving pinion. A stud No. 672 attached to the intermittent gear is connected by an adjustable link, consisting of units 874, 652 and 651, to a rocking arm 592, pivoted on the same spindle as the quadrant. When the shutter setting lever pin 653 is screwed through the hole in the center of the rocking arm, quadrant gear is thus locked to it and is moved by the link the required distance.

52. Depressing the releasing plunger on the outside of the shutter setting operating plate, exposes the plate and automatically throws gear wheel 597 into mesh again. This action is fully described later.

53. **To change to hand operation.** First, revolve the flexible shaft attached to the worm until the driving pinion 677 is in a free position opposite the gap in the intermittent gear 597. Now, remove the shutter setting lever pin 653 (Fig. 2) from the rocking arm and insert it through the hole in the operating plate and screw into the tapped hole provided for the purpose in the intermittent gear. The hand lever is attached rigidly to the quadrant by the screws 683 and may be operated, the sliding changer being moved direct through the gears and racks.

SHUTTER MECHANISM

54. Referring first to Fig. 7.

55. Slotted lever 589 is operated by a pin on the plunger sliding in the shutter setting lever plate. The spindle on which this slotted lever is mounted passes through the bearing in the camera body and carries a bell crank 593, shown in Fig. 8. This figure is a cross sectional drawing illustrating the focal plane shutter 870, safety shutter 831, and interlocking gear.

56. The escapement wheel 594 is fastened to a shaft which is driven by the intermittent gear 597. The escapement wheel is timed in such a way that the aperture is positioned opposite a rib on the bell crank at the same time as the intermittent gear is moved to its free position. It will be apparent that the bell crank cannot be moved unless the escapement wheel is in this position.

57. When the bell crank is moved toward the center of the escapement wheel the stop pin on this wheel passes under the crank, due to the influence of a spring pressing on the intermittent gear. The downward movement of the crank frees the escapement wheel and thus allows it to make one revolution. The bell crank at the same time lifts the safety shutter by means of an adjustable link 700, while the final movement releases the shutter operating gear latch No. 704. This allows the focal plane shutter 870 to fly back under the tension of a spring in the shutter rollers. To re-wind the focal plane shutter, a cam 695 is secured to the spindle carrying the gears, which are operated by the quadrant 995.

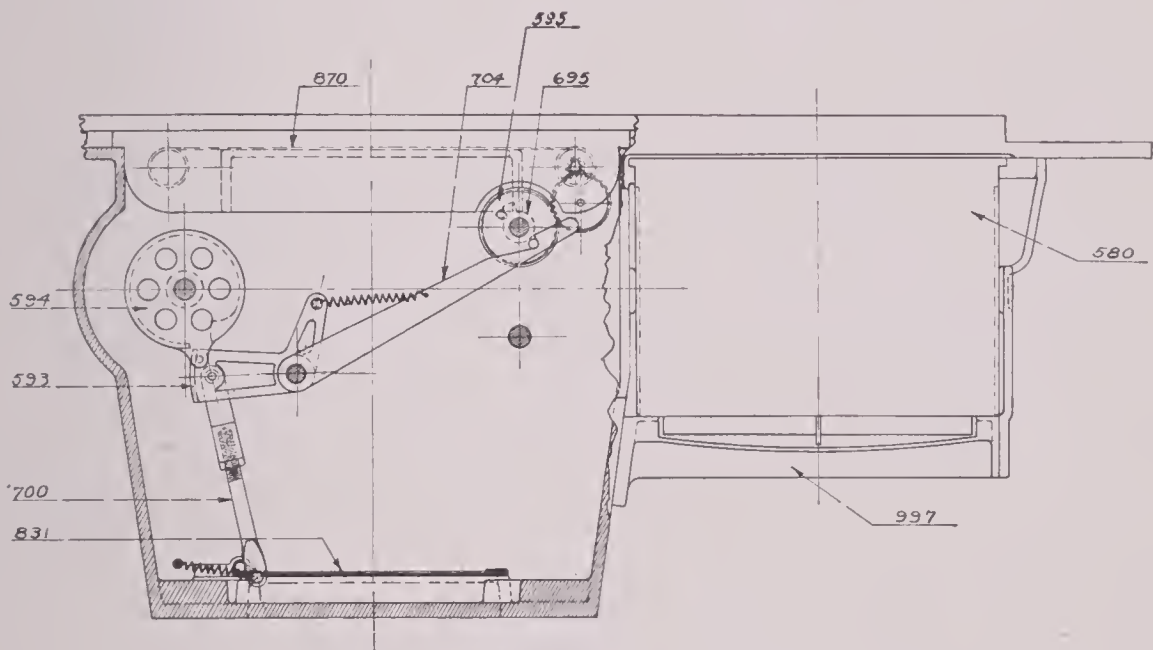


Figure 8

DISMANTLING

58. It is a simple matter to take the camera to pieces, being chiefly dependent on careful manipulation of screw driver and spanner, but the correct way is to do it in such a manner that the minimum amount of time is required afterwards to reassemble and put it in working order.

59. Screws, nuts, washers, pins, etc., should be placed together in a receptacle to prevent being lost. Valuable time is often wasted looking for small missing parts. Taper pins must be reinserted at once in their respective parts.

60. To remove the shutter setting operating plate 587, first disconnect the hand lever by removing the three nuts at the bottom end and then unscrew the three screws around the edge of plate.

61. The adjustable link, consisting of units 874, 652 and 651, in the gear box are set to the correct length before leaving the factory and should not be interfered with unless the fitting of new parts renders it absolutely necessary.

62. The quadrant 995 is mounted on a spindle which passes through to the small gear box on the opposite side of the camera. The quadrant and spindle may be moved intact, first unscrewing the small screw in the opposite end of the spindle.

63. Do not attempt to remove the worm gear before first detaching the lock nut inside the camera on the shoulder screw. The shutter tension should be fully released before dismantling.

ASSEMBLING

64. The intermittent gear, escapement wheel and bell crank should be erected first, in the order mentioned. Next, replace the worm gear, locking it in position by the nut before mentioned. Quadrant and rack gears may now be fitted, also the adjustable link, lastly, the worm spindle.

65. **Timing the Rack Gears.** Before laying the sliding changer, carrying the racks, in position, see that the prick punch mark on one of the teeth of the quadrant lines up with a corresponding mark on the pinion meshing with same. Place the changer at its extreme position at the left side of camera, the right end being tilted slightly above the gears, then with a screw driver or similar object, take up the back lash of these gears, and drop changer into position.

66. **Timing the Shutter Gears.** Set the crank 663 in position for top tension. Wind the whole of the shutter on to tension roller and hold it there while replacing the shutter frame. The action of dropping the shutter frame into the center opening will move the shutter operating gear 595 through the fraction of a revolution sufficient to give it the correct amount of lead. Now, move the tension lever in a clockwise direction, removing the stop screw for this purpose. This will take up any slack in the shutter.

67. If all the gears have been correctly timed, the sliding changer will be held against the end stop when at rest, and the first movement of

the hand lever will cause the changer to slide $\frac{1}{4}$ " to $\frac{1}{8}$ " before picking up the blind. This should be tested before replacing the top cover plate.

68. **Incorrect Timing** may cause:

- (1) The sliding changer to stop before it reaches the end of its travel at either end. In one case the plates may fail to drop into position, and in the other case, the flat indicator on top of the cover plate, will not record correctly.
69. (2) The focal plane shutter to commence to move at the same time as the sliding changer. This means that the shock of stopping the shutter will be taken by the driving gears, which will in consequence be damaged sooner or later.
70. (3) Focal plane shutter to commence to move too late. In this case, sliding changer will reach the end of its travel before the focal plane shutter is fully re-wound.

71. These points will be avoided if the timing instructions are followed accurately.

LUBRICATION

72. The main spindles through the body of the camera move comparatively slowly, and if properly greased when the camera is erected, require no further attention.

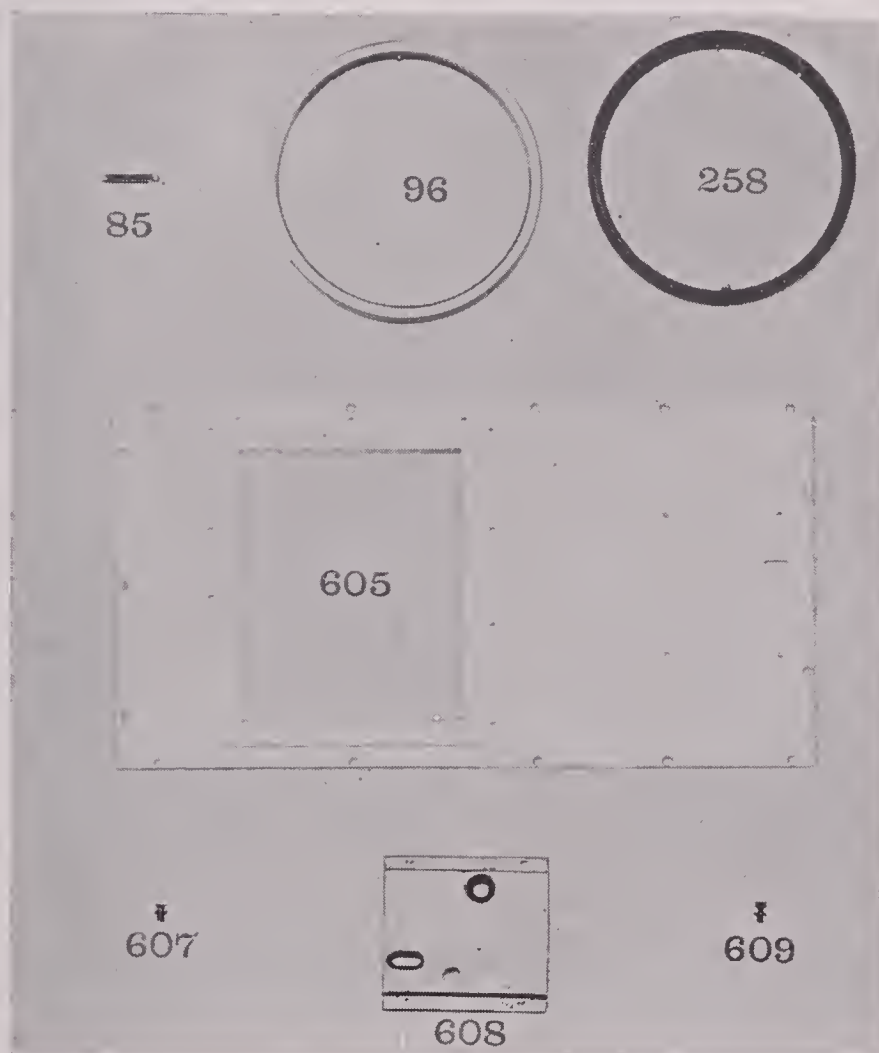
73. The following, however, should be lubricated periodically:

74. (a) Ball bearings on worm spindle and teeth of worm wheel. Vaseline is best for this purpose.
75. (b) Propeller journal. A grease cup is provided for this purpose.
76. (c) Plunger spindle. A few drops of light machine oil.
77. (d) Pivots and pins in the gear box should be oiled periodically.

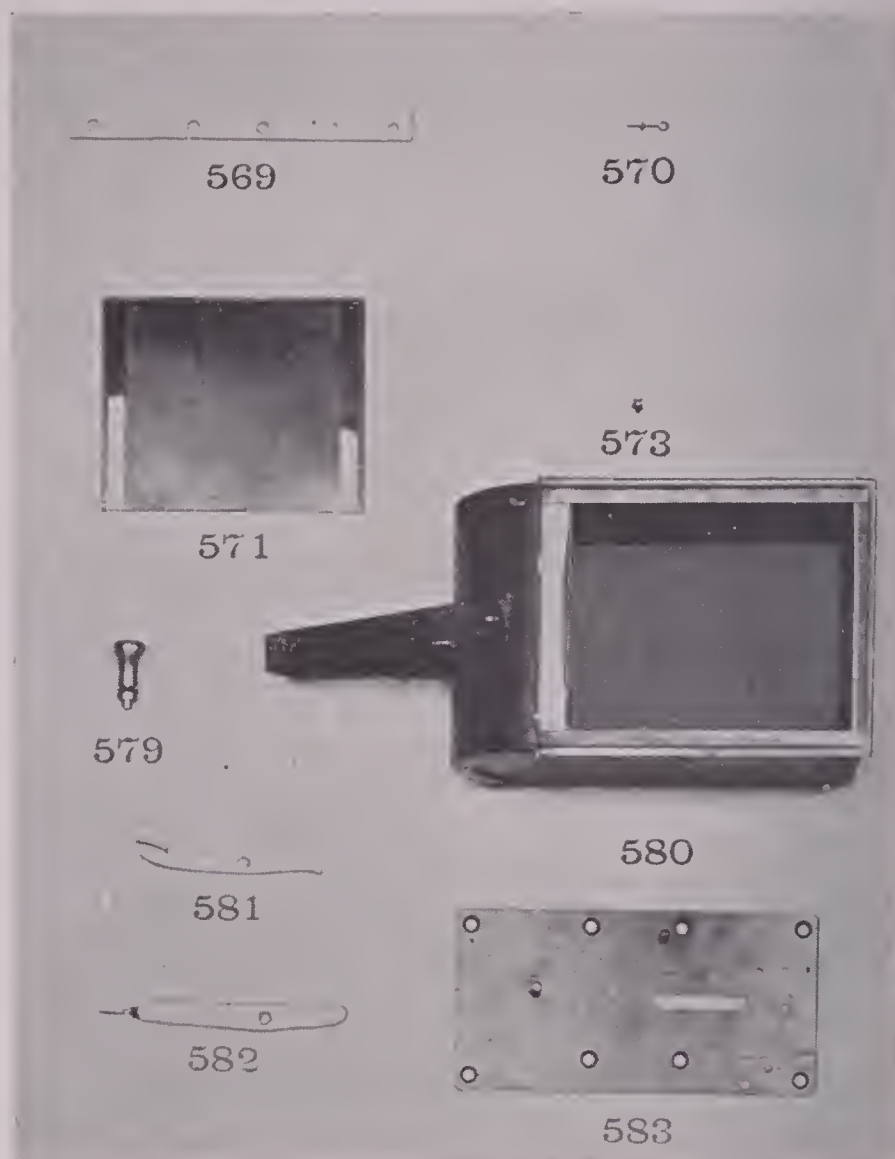
DON'TS

78. (1) Don't load septums with plates that are so thick that they have to be crowded into the septum, or plates that will not fully clear the upturned lip at the open edge.
79. (2) Don't attach the magazine until the sliding changer is in the back position.
80. (3) Don't open loaded magazine until it is in position.
81. (4) Don't withdraw magazines while open.
82. (5) Don't use bent or damaged septums.
83. (6) Don't try to take photographs without tension on the shutter, and see that tension lever is locked in required position by spring knob.

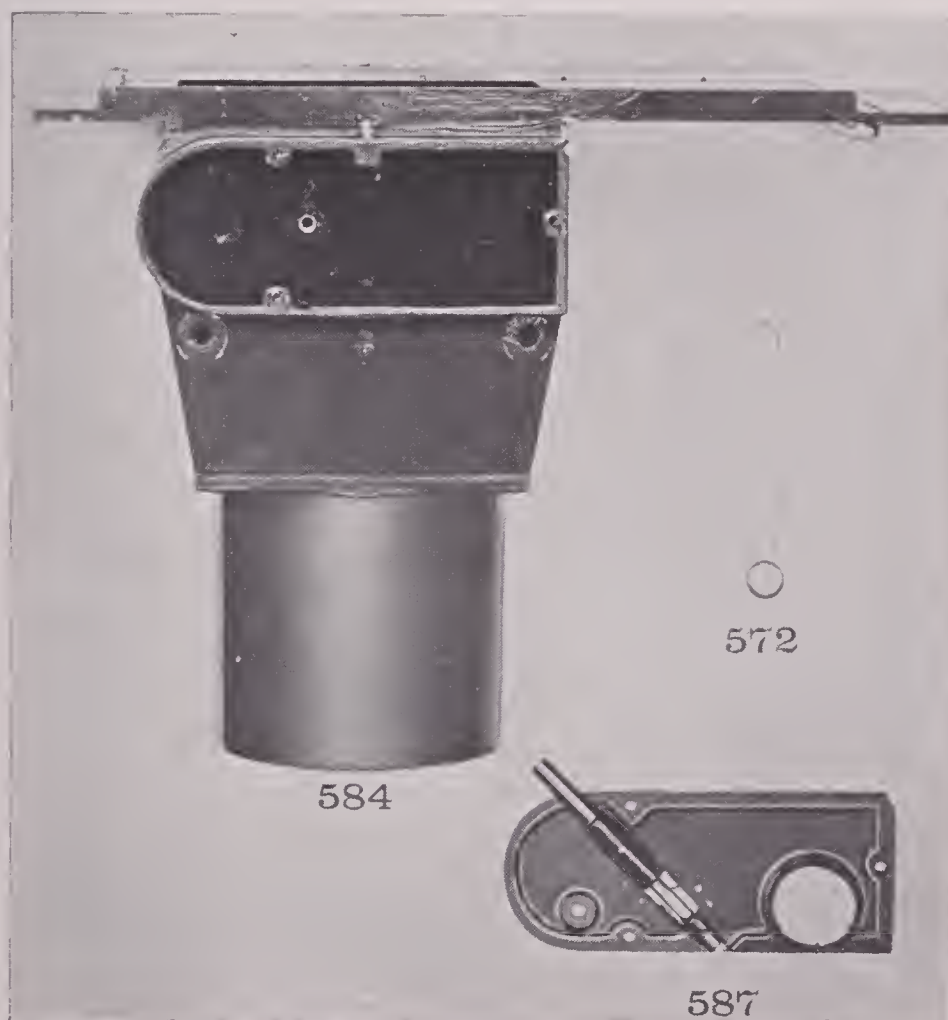
- 84. (7) Don't depress the plunger with the setting lever pin out of position.
- 85. (8) Don't operate the hand lever like a pump handle. Move it backwards and forwards to extreme positions once only for each exposure.
- 86. (9) Don't use a left hand propeller for a forward drive or vice versa. They give opposite rotations.
- 87. (10) Don't tie knots in the cable release. It will not work with kinks in the casing.
- 88. (11) Don't use a 10" screw driver on a small screw or a 6" spanner on a small nut. Proper tools for the purpose will be found in the repair kit.
- 89. (12) Don't use the magazine guide bracket as a carrying handle. It was not designed for that purpose.
- 90. (13) Don't attempt to straighten a propeller blade if it has become bent. If a propeller becomes injured, discard it for a new one.



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
85	Shutter Adjusting Holder Slide	1
96	Lock Ring for Lens Adjusting Sleeve.	1
258	Sleeve Protecting Ring.	1
605	Magazine Holder Frame Plate	1
607	Magazine Holder Screw	18
608	Exposure Indicator Top Plate.	1
609	Exposure Indicator Assembly Screw	4



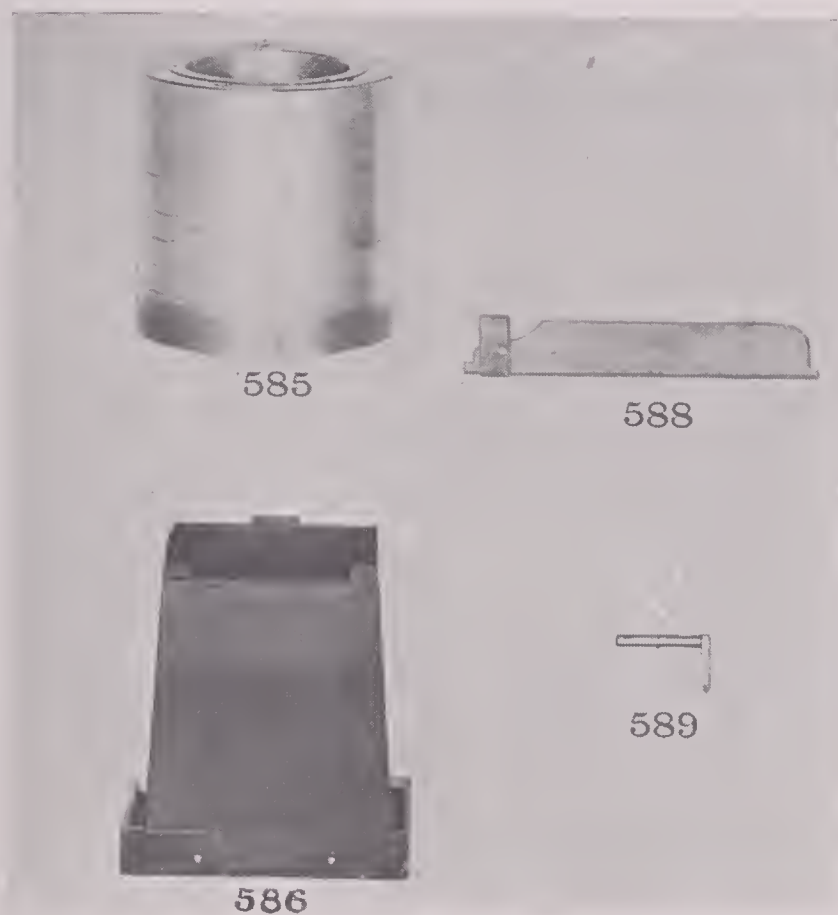
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
569	Mag. Holder Outside Slide-Lower	1
570	Pin for Castle Lock Nut	1
571	Septum Complete	1
573	Scr. for Mag. Guide Pad	2
579	Hand Exposure Lever Knob	1
580	Magazine Complete	2
581	Short Magazine Release Lever with Stop Stud	1
582	Long Magazine Release Lever with Stop Stud	1
583	Exposure Base Plate Assembly	1



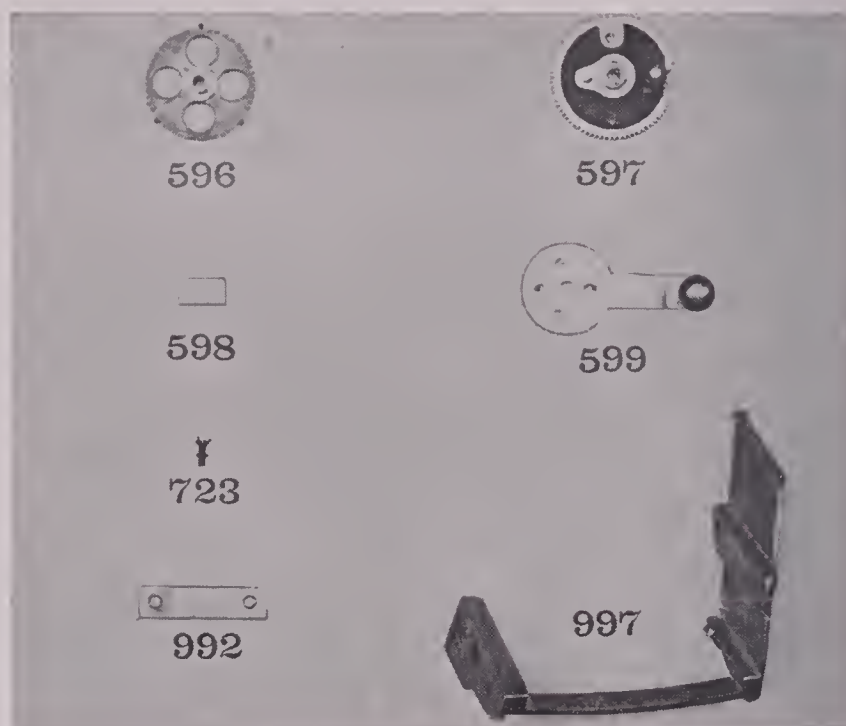
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
572	Hand Exposure Lever Assembly.	1
584	Case Assembly	1
587	Shutter Setting Operating Plate with Bearing.	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
577	Mag. Slide Frame Bed—Formed	1
590	Septum Support Assembled	2
591	Fan Bearing Sleeve with Oil Cup	1
592	Connecting Rod Crank with Stud	1
593	Bell Crank Assembly	1
594	L. H. Gear Shaft Wheel with Pin.	1
595	Shutter Operating Gear R. H. Complete	1
611	Mag. Slide Frame Bed—Plain	1



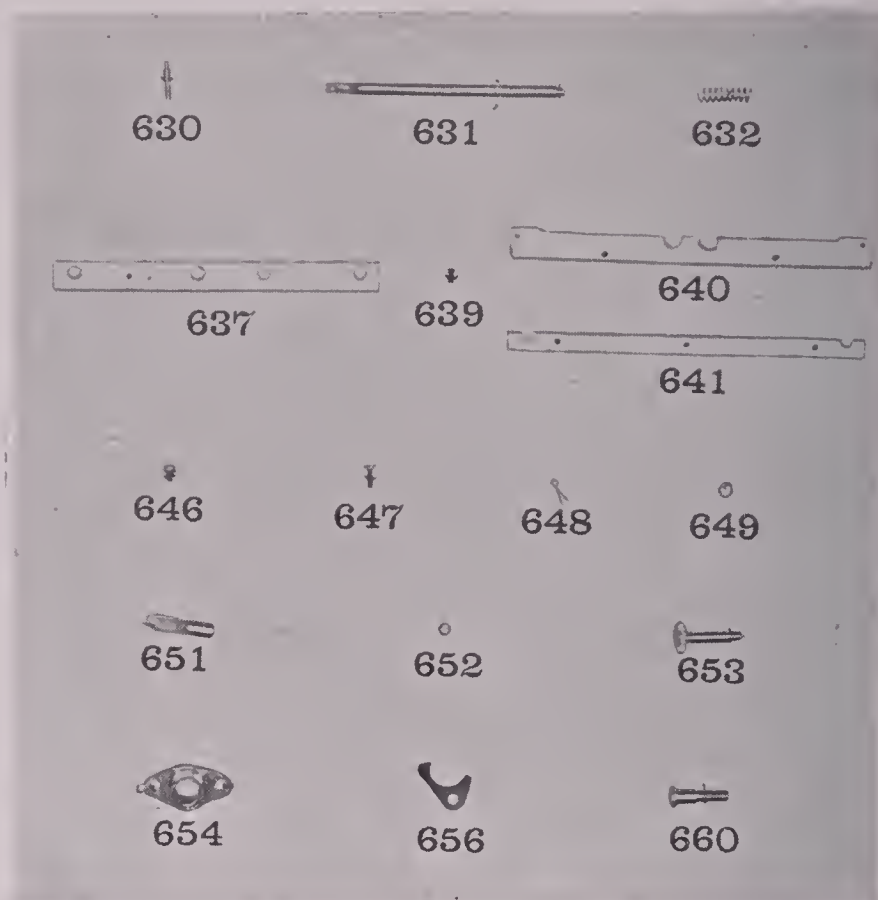
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
585	Lens Adjusting Sleeve Complete	1
586	Shutter Frame Assembled	1
588	Shutter Plate R. H. with Bracket	1
589	Fork Crank Assembled	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
596	Shutter Operating Gear L. H. Complete.....	1
597	L. H. Gear Assembled	1
598	Oil Plate.....	1
599	Shutter Setting Lever Complete	1
723	Lens Adapter Screws	5
992	Mag. Guide Pad	1
997	Magazine Guide Assembly.....	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
613	Propeller Shaft Bracket	1
614	Propeller Shaft Bracket Clamp	1
615	Screws for Flexible Shaft Anchor & Propeller Shaft Bracket	6
616	Propeller Shaft Bracket Clamp Screw Nut	4
617	Lock Washers.	7
620	Shutter Operating Plate Screws	3
621	Operating Plate Spring Screws	2
622	Operating Plate Spring	1
624	Shutter Setting Gear Screw Nut	3
625	L. H. Gear Case Plate	1
626	Screw for L. H. Gear Case Plate & Shutter Setting Shaft . . .	6
627	Hand Shutter Oper. Plunger Button	1
628	Hand Shutter Oper. Plunger Screw Nut.	1
629	Hand Shutter Oper. Plunger Screw	1



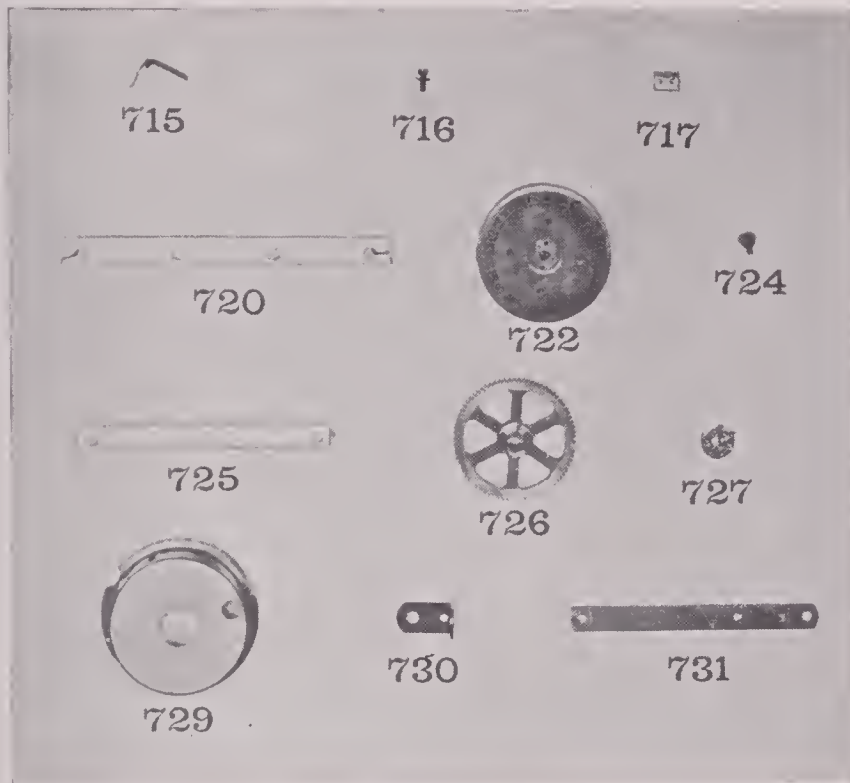
Unit No.	Description	No. Per Camera
630	Hand Shutter Oper. Plunger Stud	1
631	Hand Shutter Oper. Plunger Shaft.	1
632	Hand Shutter Oper. Plunger Spring.	1
637	Magazine Holder Outside Slide—Upper	1
639	Screws for Mag. Slide Frame Bed, Shutter Plate Assem. & Mag. Guide Assem.	24
640	Camera Frame End Right.	1
641	Camera Frame End Left.	1
646	Septum Holder Spring Screws.	2
647	Magazine Holder Frame Plate Screw short.	8
648	Crank Stud Cotter Pin.	7
649	Crank Stud Cotter Pin Washer	3
651	Connecting Rod Top	2
652	Connecting Rod Lock Nut.	2
653	Shutter Setting Lever Pin.	1
654	Flexible Shaft Anchor.	1
656	Flexible Shaft Anchor Spring.	1
660	Worm Gear Stud.	1



Unit No.	Description	No. Per Camera
661	Worm	1
662	Worm Bearing & Fan Bearing	4
663	L. H. Gear Shaft Crank	1
664	Locking Pin	1
665	Locking Pin Spring	1
666	Septum Holder Spring	2
669	L. H. Gear Shaft	1
678	L. H. Gear Shaft Crank Stop Screw	1
679	Gear Shaft	1
680	Shutter Setting Shaft Washer	2
682	Taper Pin	9
684	Shutter Setting, Gear Shaft	1
686	Magazine Operating Gear Right	1
687	Magazine Operating Spring	1
688	Screw for Magazine & Shutter Oper. Spring	2



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
690	Magazine Operating Gear Pinion	1
695	Shutter Operating Gear Cam	1
696	Shutter Operating Spring	1
697	Flexible Shaft	1
700	Safety Shutter Connecting Rod	1
704	R. H. Shutter Operating Gear Latch	1
705	Spring For R. H. Shutter Oper. Gear Latch	1
706	Safety Shutter Spring	1
713	Safety Shutter Hinge Washer	1
714	L. H. Gear Spring —Large	1



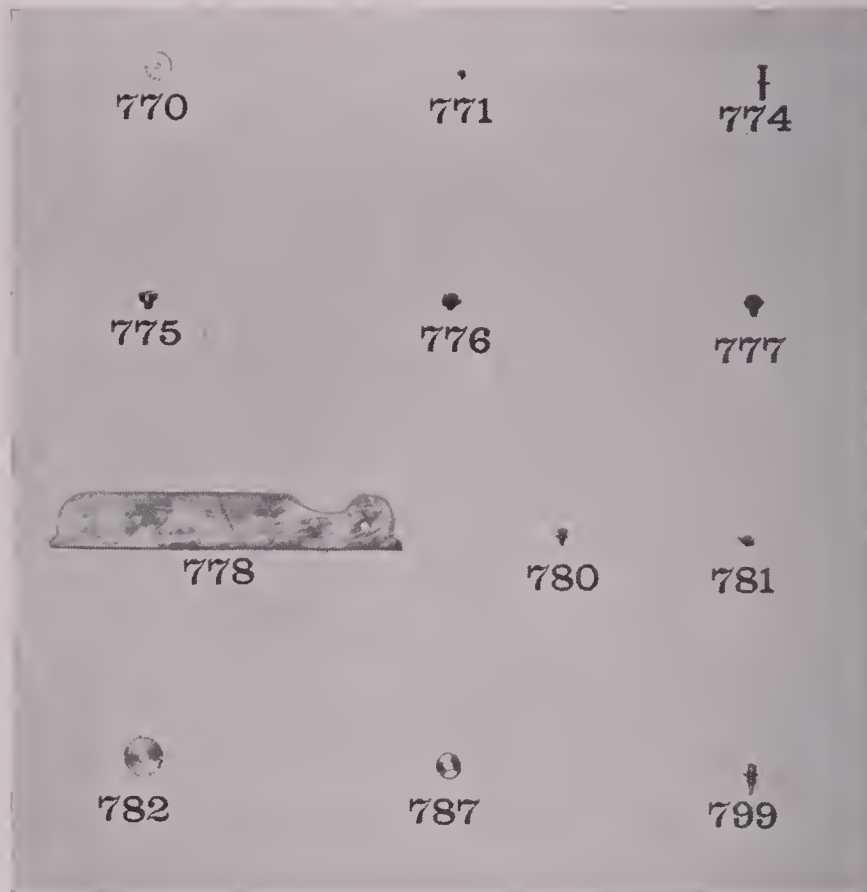
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
715	L. H. Gear Spring—Medium.	1
716	L. H. Gear Spring Screw.	2
717	L. H. Gear Spring Nut.	1
720	Magazine Holder Slide—Plain side	1
722	Counter Wheel Complete.	1
724	Magazine Lever Screw.	2
725	Magazine Holder Stop.	2
726	Magazine Operating Gear—Left.	1
727	Worm Thrust Bearing	1
729	Counter Cover.	1
730	Hand Lever Link.	1
731	Hand Exposure Lever.	1



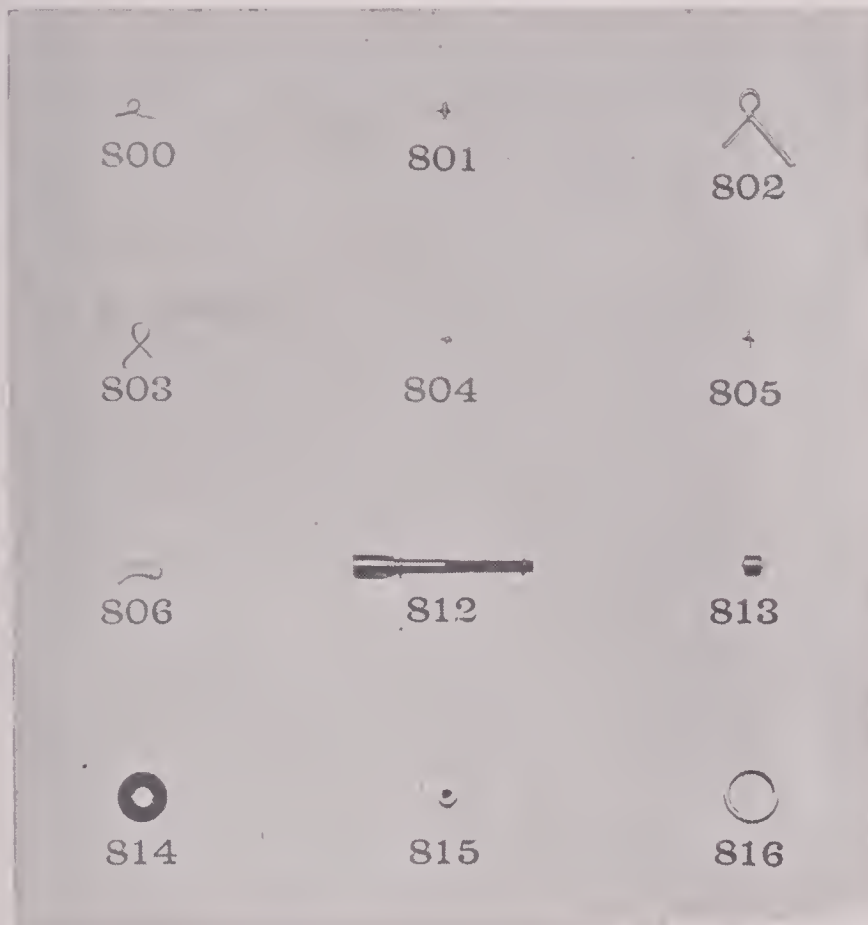
Unit No.	Description	No. Per Camera
732	Exposure Lever Knurled Nut	1
733	Hand Lever Stud Screw	1
736	Hand Lever Spring	1
737	Hand Lever Spring Screw	1
738	Pawl Stud	1
739	Pawl	1
740	Exposure Indicator Base	1
741	Pawl Spring	1
742	Counter Detent Spring	1
743	Counter Detent Screw	1
744	Pins for Pawl Spring	1
745	Counter Stud	1
746	Hand Lever Stud	1
747	Washers for Counter Stud & Hand Lever Stud	2
748	Top Washer for Hand Lever Stud	1



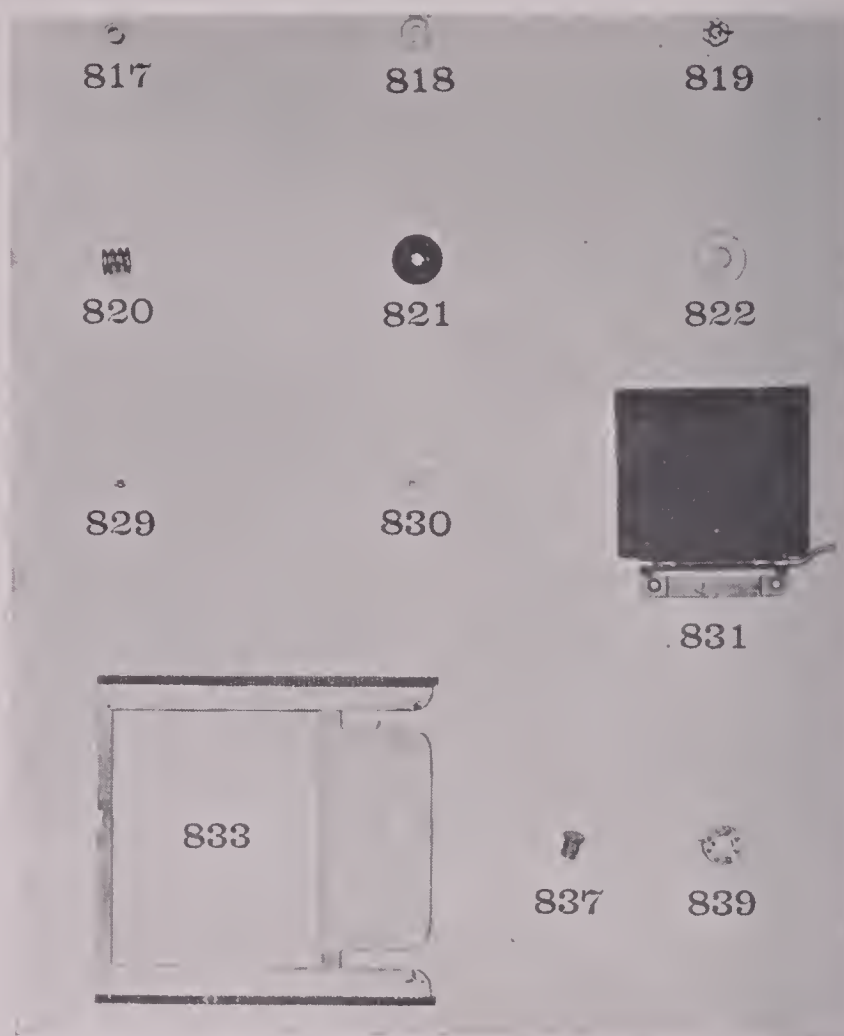
<i>Unit</i>		<i>No. Per</i>
<i>No.</i>	<i>Description</i>	<i>Camera</i>
749	Exposure Pawl.....	1
750	Hand Lever Guide Assembly	1
751	Screw, Cable Anchor Base Plate & Safety Shutter Hinge Bkt.	4
754	Exposure Counter Lever.....	1
755	Camera Anchor Straps.....	2
756	Anchor Strap Screws.....	4
757	Nut for Anchor Strap Screw—Hand Lever Link—& Flexible Shaft Anchor Screw	8
759	Cable Anchor Base Plate.....	1
761	Anchor Dowels.....	2
762	Hand Lever Link Stud.....	1
764	Cable Anchor Knurl Screw.....	1
769	Exposure Lever Screw.....	1



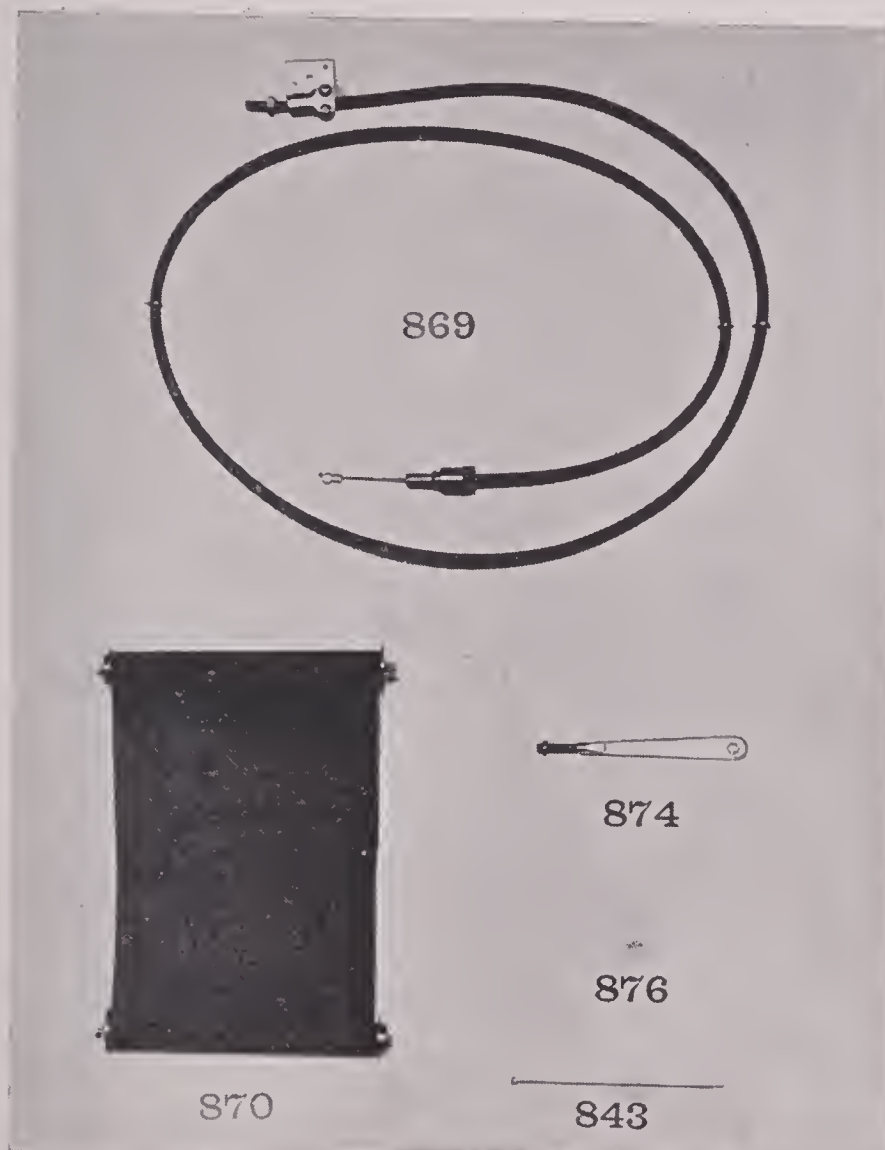
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
770	Locking Pin Button	1
771	Counter Cover Screw	4
774	Frame Assembly Screw—Long	7
775	Exposure Indicator Dial Screw	1
776	Exposure Indicator Pawl Screw	1
777	Exp. Indicator Detention Screw	1
778	Shutter Plate Left H.	1
780	Screw for Shutter Gear	1
781	Screw for Shutter Gear —Left	1
783	L. H. Shutter Gear	1
787	Washer for Dial Detention	2
799	Exposure Lever Pin	1



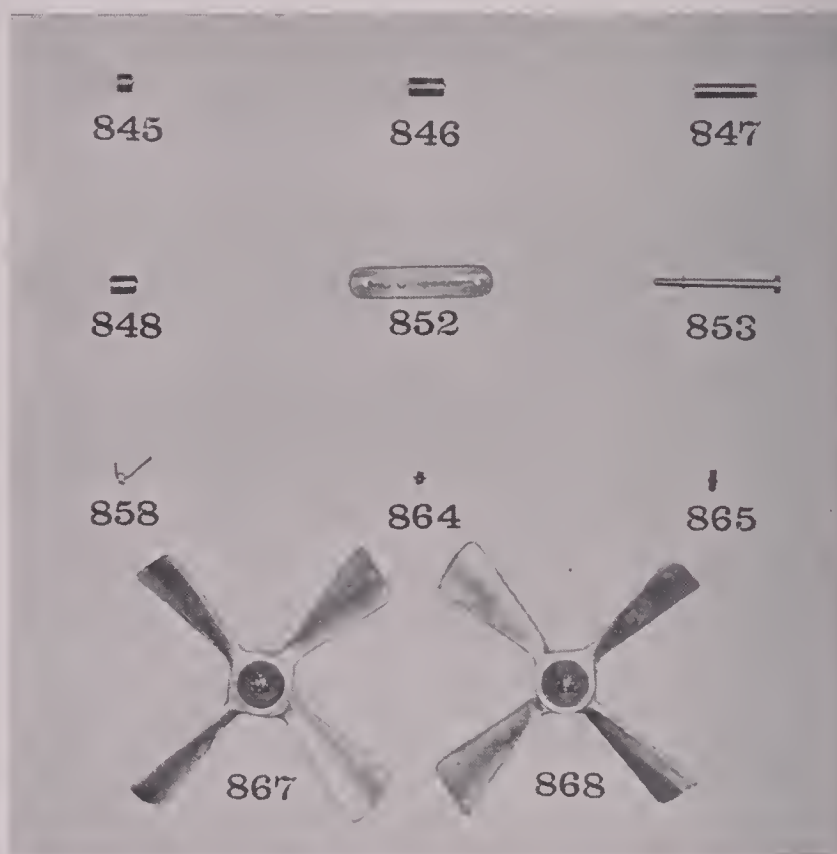
<i>Unit</i> <i>No.</i>	<i>Description</i>	<i>No. Per</i> <i>Camera</i>
800	Exposure Detention Spring.....	1
801	Pawl Pin.....	1
802	Exposure Lever Spring.....	1
803	Exposure Pawl Spring.	1
804	Exposure Pawl Pin.....	1
805	Pin for Exp. Detention & Lever Spring	2
806	Exposure Detention	1
812	Fan Connection Shaft..	1
813	Fan Connection Shaft Spacer.....	1
814	Fiber Washer No. 1	1
815	Flange Collar Large	1
816	Fan Connection Retaining Collar.....	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
817	Flange Collar Small	1
818	Shoulder Washer No. 1	1
819	Castle Lock Nut	1
820	Fan Tension Spring	1
821	Fiber Washer N. 2	1
822	Shoulder Washer No. 2	1
829	Front & Back Cap Set Screw	2
830	Pinion & Gear for Shutter Assembly	1
831	Safety shutter Assembly	1
833	Magazine Slide Frame	1
837	Oil Cup Cap	1
839	Fan Connection Thrust Bearing	1



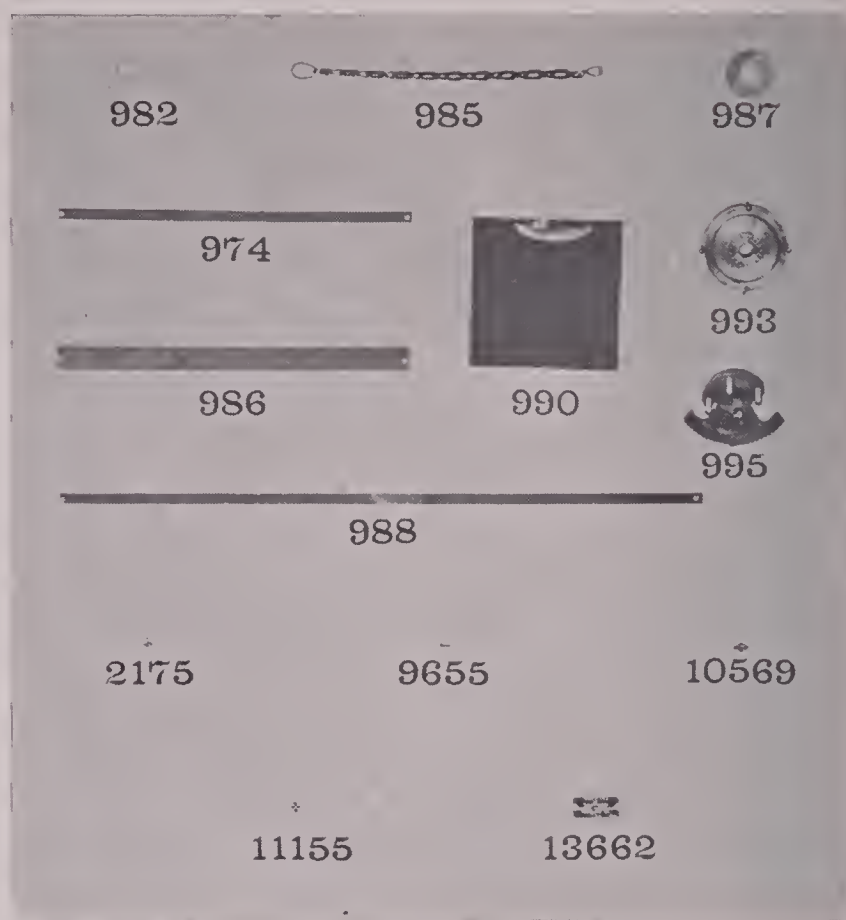
<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
843	Shutter Adjusting Cord	1
869	Cable Complete	1
870	Focal Plane Shutter Complete	1
874	Connecting Rod Complete	1
876	Cable Clip	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
845	Magazine Operating Shaft Bushing	2
846	Shutter Operating Shaft Bushing	1
847	Safety Shutter Oper. Shaft Bushing	1
848	Shutter Setting Shaft Bushing	1
852	Propeller Shaft Bracket Strap	2
853	Propeller shaft Bracket Strap Bolt	4
858	Magazine Release Lever Latch Spring	2
864	Lock Ring Screw Short	2
865	Lock Ring Screw Long	2
867	R. H. Propeller Complete	1
868	L. H. Propeller Complete	1

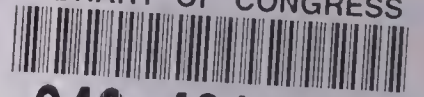


Unit No.	Description	No. Per Camera
881	Exposure Indicator Set Pin	1
885	Magazine Release Lever Screws	2
886	Counter Set Button	1
887	Counter Set Button Rivet	2
891	Shutter Frame Locating Pin	1
893	Lock Ring Spanner Wrench	1
895	Lens Focus Plate	1
899	Adapter Lock Screws	3
975	Exposure Indicator Dial Assembly	1
976	Nut for Worm Wheel Screw	1
977	Worm Wheel Washer	1
979	Pawl Stop Pin	1
981	Exposure Indicator Light Guard	1



<i>Unit No.</i>	<i>Description</i>	<i>No. Per Camera</i>
974	Light Guard Packing No. 1.....	1
982	Identification Plate.....	1
985	Connecting Link with Chain.....	1
986	Light Guard Packing No. 2.....	1
987	Washer for Shutter Oper. Gear L. H.....	1
988	Light Guard Packing No. 3.....	2
990	Filter.....	3
993	Worm Wheel with Pinion	1
995	Shutter Setting Gear Complete.....	1
2175	Screws for Name Plate, Lens Focus Plate & Oil Plate.....	8
9655	Identification Plate Rivet.....	2
10569	Exposure Pawl Detention & Spring Pin.....	2
11155	Rivet for Shutter Opr. Gear L. H.....	4
13662	Name Plate	1

LIBRARY OF CONGRESS



0 040 431 087 2